



# Organization of health services for tuberculosis case diagnosis and treatment in Manaus, Amazonas, Brazil, 2014\*


doi: 10.5123/S1679-49742019000200007

**Daniel Souza Sacramento**<sup>1</sup> –  orcid.org/0000-0002-8782-1949

**Débora Cristina Brasil da Silva Lavor**<sup>2</sup> –  orcid.org/0000-0001-7623-0089

**Laura Raquel Teixeira de Oliveira**<sup>2</sup> –  orcid.org/0000-0002-3184-7154

**Adriana Patrícia Brelaz Lopes Gomes**<sup>3</sup> –  orcid.org/0000-0003-0151-0363

**Maria Jacirema Ferreira Gonçalves**<sup>4</sup> –  orcid.org/0000-0002-8460-8501

<sup>1</sup>Prefeitura Municipal de Manaus, Secretaria Municipal de Saúde, Manaus, AM, Brasil

<sup>2</sup>Universidade Federal do Amazonas, Escola de Enfermagem de Manaus, Manaus, AM, Brasil

<sup>3</sup>Centro Universitário Nilton Lins, Manaus, AM, Brasil

<sup>4</sup>Fundação Instituto Oswaldo Cruz, Instituto Leônidas e Maria Deane, Manaus, AM, Brasil

## Abstract

**Objective:** to describe the organization of health services for tuberculosis case diagnosis and treatment in the city of Manaus, Amazonas, Brazil. **Methods:** this was a descriptive study of 156 new tuberculosis cases diagnosed and residing in Manaus in 2014, characterized according to socioeconomic, demographic, health-disease process aspects, relationship with health services and treatment outcome, by administering individual questionnaires in the 1<sup>st</sup> and 6<sup>st</sup> months of treatment. **Results:** some 70% of cases were diagnosed at the tuberculosis reference center; most of the cases were unaware that there was a community health agent in their neighborhood; regarding treatment follow-up, 55.3% had to join an appointment waiting list; only 67.3% of cases were monitored by the same professional throughout entire treatment. **Conclusion:** the findings indicate presence of barriers to case diagnosis and treatment, both in the referral center and also in primary healthcare units.

**Keywords:** Tuberculosis; Health Services; Diagnostic Services; Time-to-Treatment.

\*Article derived from the Master's Degree thesis "Follow-up of new tuberculosis cases: clinical/epidemiological profile and organization of the health service", defended by Daniel Souza Sacramento at the Postgraduate Program in Public Health, Society and Endemic Diseases, Federal University of Amazonas, and Leônidas and Maria Deane Institute/Oswaldo Cruz Foundation, in 2015.

## Correspondence:

**Daniel Souza Sacramento** – Av. Barcelos, No. 2228, Praça 14 de Janeiro, Manaus, AM, Brazil. Postcode: 69020-200  
E-mail: dsacramento@ig.com.br

## Introduction

Tuberculosis (TB) is one of the oldest known infectious diseases on record and it has been susceptible to treatment with drugs for more than half a century. Even so, TB remains one of the most common diseases in the world.<sup>1</sup>

In spite of many strategies adopted in Brazil for its control, 66,796 new TB cases were reported in Brazil in 2016 with an estimated incidence rate of 32.4 cases per 100,000 inhabitants for the country as a whole, while in state of Amazonas the rate was 67.2 cases per 100,000 inhabitants.<sup>2</sup>

In the process of consolidating the Brazilian public health system, Primary Health Care was intended to be its mainstay and the service user's entry point to the health care network.<sup>3</sup> As this proposal has not yet been perfected, users find themselves having to seek other levels of health care services.<sup>4</sup>

Timely seeking of health care and access to it, as well as in-service treatment continuity, involve aspects related to the need for health services, available technology, care resolvability, access conditions, agile service provision and booking of medical appointments, as well as the bond established by service users with health professionals. These aspects are crucial for defining service choice and how long it takes someone to seek health services.<sup>5,6</sup> The identification of factors acting on the organization of health services, regarding TB control, can contribute to the understanding of the phenomenon and to the improvement of health care services for patients.

*In the process of consolidating the Brazilian public health system, Primary Health Care was intended to be its mainstay and the service user's entry point to the health care network.*

The objective of this study was to describe the organization of health services for tuberculosis case diagnosis and treatment in the municipality of Manaus, capital of the Brazilian state of Amazonas.

## Methods

We carried out a descriptive epidemiological study, with primary data collection, taking as our reference population

newly diagnosed TB cases living in the municipality of Manaus in 2014, and who were in treatment in the Brazilian National Health System (SUS) Primary Health Care network. The term "primary health care units" (PHCU) comprises primary health care units, private clinics and Family Health Units, all of which are considered to be PHCU because they provide outpatient care.

The city of Manaus accounts for half of the population of the state of Amazonas and every year registers around 70% of new reported TB cases in the state. In 2003, the process of Tuberculosis Control Program (TCP) action decentralization began at state and municipal level, using as a parameter the proposals of the National Tuberculosis Control Program (NTCP). Only in 2006 did the primary health care units (PHU) begin to have greater participation in TB case diagnosis and treatment.<sup>7</sup>

The Manaus municipal health network is organized into four Health Districts in the urban area and one in the rural area, totaling 280 health establishments. TCP is implemented throughout the municipal Primary Health Care services. Besides providing urgent care, emergency services are of a mixed nature since apart from offering all primary care programs, they also provide outpatient care. The same occurs in the specialty polyclinics, which are referral units for medium complexity services.

Even with the recognition and expansion of the role of Primary Health Care in TB control in Manaus, as at 2012 at least 37.8% of new cases were notified by the Cardoso Fontes Polyclinic, a state-level referral center for TB control. As a strategy for directing care and follow-up, new bacilliferous TB cases diagnosed at the referral center, are sent to SUS Primary Health Care services for notification and continuity of care. Most people seeking care go to the referral center, which still accounts for most of the newly diagnosed cases in the city. This is why the sampling process used in our research was based on a TB case diagnosis surveillance system at that referral center.

The study's inclusion criteria were: new cases, resident in the municipality of Manaus, in the first 30 days of treatment, 18 years old or more and with intact communication and understanding ability. We excluded patients transferred to other places outside the municipality of Manaus, those who did not undergo outpatient monitoring at local Primary Health Care services and those who declared themselves to be indigenous people.

For case recruitment, we included all new cases detected during data collection who attended the Cardoso Fontes Polyclinic. When calculating the sample size, we assumed the loss to follow-up prevalence rate of 9.3% registered in 2011, according to data from the Notifiable Diseases Information System (SINAN), with a maximum estimation error of five percentage points and a 95% confidence level. The sample for the infinite population was estimated to be 130 individuals, plus 20% for possible losses, totaling 156 new TB cases.

We administered an individual questionnaire, comprised of closed questions about the characterization of the patients studied:

a) Demographic characteristics

- Sex (male; female);
- Age (in years: 18 to 29; 30 to 59; 60 or more)
- Ethnicity/skin color (brown; not brown)
- Marital status (single; not single)
- Number of people in the household (up to 2; 3 or more)

b) Socioeconomic status

- employed (yes; no)
- monthly income (in monthly minimum wages: up to 1; 1 to 3; 3 or more)
- education level (in years of study: less than 8; more than 8);
- presence of comorbidities (yes; no)

c) Behavioral habits

- tobacco smoking (yes; no);
- regular use of drugs (yes; no)
- anti-HIV serological testing (positive, negative; not tested)

d) Patient's relationship with health care services

- means of finding health service (on their own initiative, recommended by friends; sent by a professional or health service)
- clinical form (pulmonary and extrapulmonary)
- felt they were listened to during initial care (always/most of the time; never/hardly ever)
- know the community health agent (CHA) in their neighborhood (yes; no; or there is no CHA)

e) Patient's relationship with the treatment service

- medical appointment booking (in advance, or referral; join an appointment waiting list)
- waiting time for initial care (up to 1 hour; more than 1 hour)
- monitoring of treatment by the same health professionals (always; most of the time; hardly ever)

- if they have doubts about the disease/treatment, who do they ask (family and friends; health professionals; didn't need to ask [and if they ask health professionals, what level are they: professional with a graduation degree, high school level professional])
  - how do they book a return appointment (scheduled in advance; join an appointment waiting list)
  - received home visits (yes; no)
  - if bacilliferous, how many follow-up sputum smears did they have (up to 3; more than 3)
  - number of months in which they missed appointments (none; 1 month or more)
  - number of months in which they were late for appointments (none; 1 month or more)
  - wanting to continue treatment at this health service – 1<sup>st</sup> month (yes; no)
  - wanting to continue treatment at this health service – 6<sup>th</sup> month (yes; no)
  - treatment outcome (cured; not cured).
- (these last two items were evaluated at the end of the 6<sup>th</sup> month of treatment).

In this study, time elapsed before seeking treatment refers to the time between the moment symptoms are perceived and going to a health service in search of treatment. Diagnosis time refers to the time between first care and TB diagnosis.

The data collection instrument/questionnaire was developed based on previous studies, which resulted in the construction of indicators related to adherence to TB treatment,<sup>8,9</sup> apart from being based on questions that the authors considered relevant for the understanding of the panorama studied and of the organization of TB control health services. We tested the instrument beforehand and the research team was duly trained in data collection and well as having a field manual for guidance. We also used the questionnaire to record data from the SINAN TB notification form, as well as data contained in the case monitoring record book and patients' medical records. This data was accessed during case closure in order to obtain information about the outcome or transfer to another health service.

For case recruitment, we developed a surveillance and communication system with the municipal coordination of the Tuberculosis Control Program in the city of Manaus, and with the Amazonas state TB referral center. The purpose of the system was to inform the number of patients starting treatment and the date scheduled for their return to the health service.

The interviews were conducted in health care services, preferably during two returns for follow-up: the first interview took place at the referral center in the first 30 days of treatment (from January to November 2014); and the second interview took place in the sixth month of follow-up, in order to obtain information about treatment and to verify the relationship of users with health care services (from August 2014 to September 2015).

The data were input to the system using a double entry process, in order to correct for possible typing errors; they were subsequently analyzed using SPSS 21.0 software. The variables were described according to their frequency and distribution, and stratified by place of diagnosis and/or treatment.

All participants were informed and invited to show that they agreed with and were aware of the research conditions by signing a Free and Informed Consent Form. The research project received Research Ethics Committee approval: Certification of Submission for Ethical Appraisal (CAAE) No. 30929514.3.0000.5020.

## Results

We recruited 156 patients, of whom 152 were interviewed. The losses relate to death from TB (1), death due to other causes (1), diagnosis change (1), and treatment carried out in a hospital (1).

The predominant characteristics were: males (63.2%); ethnicity/skin color: brown (73.7%); aged 30 to 59 years old (56.6%) and living with more than two people in the household (80.3%). Of the total number of cases, 61.8% had a formal and/or informal job, with a monthly income of up to one monthly minimum wage (46.7%) and education level of more than eight years of schooling (59.9%). In relation to their habits, 19.7% of patients were smokers, 31.6% used alcohol regularly and 9.9% were regular users of drugs (psychoactive substances), as seen in Table 1.

The majority of cases (69.1%) were diagnosed at the referral center, followed by emergency care units or hospitals (25.0%) and PHCUs (5.9%). Out of the 105 cases diagnosed at the referral center, 65 (61.9%) continued their treatment at this place and the others were sent to PHCUs. We did not observe heterogeneity among the variables evaluated regarding the place of diagnosis and treatment; however, most of the patients who were employed or who had higher schooling level sought emergency care services (Table 1).

In Table 2 we present case distribution in relation to diagnosis services. Most patients went to a service recommended by a health professional or health service. However, around a quarter of cases went to a service recommended by friends or one chosen on their own initiative, whereby the referral center was the most accessed service. The pulmonary clinical form of TB was the most prevalent among the research subjects (82.2%), and more than 90% felt they were listened to in initial care in all diagnosis services studied. It is noteworthy that 78.3% of the patients said they were unaware of the existence of community health agent (CHA) in the family health team working in their neighborhood/place of residence.

Figure 1 shows the distribution of time elapsed before seeking treatment, time until diagnosis and treatment duration, according to the places of diagnosis and treatment. The median time elapsed before seeking treatment, i.e. from the first symptoms to accessing a service, was 27 days for emergency services, and 30 days for the referral center and PHUs.

The median diagnosis time for the total number of cases was 15 days, this being similar to that observed at the emergency care services (median = 15.5 days) and at the referral center (median = 15 days), while it was longer at the PHUs (median = 21 days). Regarding treatment time, we observed a shorter median treatment time in cases treated at the referral center (median = 6 months), compared to the time spent monitoring cases at PHUs that did not have the Family Health Strategy (FHS) (median = 8 months). Median treatment time at PHUs with FHS was 7 months.

Table 3 shows data concerning patient relationship with the health service, per place of treatment. In most cases, patients stated that they had to join waiting lists to book follow-up visits. This fact was more frequent among referral center patients. The waiting time for initial care was up to an hour in most cases (88.8%); most of the time monitoring was carried out by the same health professionals (31.3%). It is noteworthy that 13.3% of patients reported asking family or friends when they had doubts about TB.

Only patients monitored by PHCU stated they received home visits at some moment during treatment, especially those monitored by PHCU with no FHS. Among those who received home visits, 30% did not complete treatment (data not shown). Having smear microscopy during monitoring, the number of missed and late attendances at medical appointments obtained satisfactory percentages, regardless of the service that monitored the treatment (Table 3).

**Table 1 – Demographic and socioeconomic characterization of new tuberculosis cases according to place of diagnosis and treatment, Manaus, Amazonas, 2014**

Variables	Place of diagnosis			Place of treatment			%
	Referral center	Emergency care/hospital	PHCU <sup>a</sup>	Referral center	PHCU <sup>a</sup> without FHS <sup>b</sup>	PHCU <sup>a</sup> with FHS <sup>b</sup>	
	(n=105)	(n=38)	(n=9)	(n=65)	(n=70)	(n=17)	
<b>Sex</b>							
Male	63	30	3	38	48	10	63.2
Female	42	8	6	27	22	7	36.8
<b>Ethnicity/skin color</b>							
Brown	79	26	7	45	54	13	73.7
Not brown	26	12	2	20	16	4	26.3
<b>Marital status</b>							
Single	61	17	3	28	42	11	53.3
Not single	44	21	6	37	28	6	46.7
<b>Age group (in years)</b>							
18-29	32	14	3	18	26	5	32.2
30-59	62	19	5	39	38	9	56.6
≥60	11	5	1	8	6	3	11.2
<b>Number of people in the household</b>							
Up to 2	26	3	1	12	11	7	19.7
3 or more	79	35	8	53	59	10	80.3
<b>Employed</b>							
Yes	62	27	5	37	47	10	61.8
No	43	11	4	28	23	7	38.2
<b>Monthly income (in monthly minimum wages)</b>							
Up to 1	55	12	4	29	34	8	46.7
1 to 3	43	16	2	23	29	9	40.1
More than 3	7	10	3	13	7	0	13.2
<b>Education level (in years of schooling)</b>							
<8	50	10	1	19	30	12	40.1
>8	55	28	8	46	40	5	59.9
<b>Presence of comorbidities</b>							
Yes	52	19	5	33	33	10	50.0
No	53	19	4	32	37	7	50.0
<b>Smoking</b>							
Yes	27	2	1	10	14	6	19.7
No	78	36	8	55	56	11	80.3
<b>Drinking</b>							
Yes	39	7	2	16	25	7	31.6
No	66	31	7	49	45	10	68.4
<b>Regular use of drugs</b>							
Yes	10	5	0	5	8	2	9.9
No	95	33	9	60	62	15	90.1
<b>Anti-HIV<sup>c</sup> serological testing</b>							
Positive	3	1	0	1	2	1	2.6
Negative	63	24	7	41	43	10	61.9
Not tested	39	13	2	23	25	6	35.5

a) PHCU: primary health care unit.

b) FHS: Family Health Strategy.

c) HIV: human immunodeficiency virus.

**Table 2 – Patient relationship with tuberculosis diagnosis service, Manaus, Amazonas, 2014**

Variables	Diagnosis service			%
	Referral center	Emergency care/hospital	PHCU <sup>a</sup>	
<b>How did the patient reach the health service</b>				
On their own initiative, or recommended by friends	32	2	2	23.7
Sent by health professional or health service	73	36	7	76.3
<b>Clinical form</b>				
Pulmonary	92	27	6	82.2
Extra-pulmonary	13	11	3	17.8
<b>Felt they were listened to during initial care</b>				
Always/most of the time	94	35	8	90.1
Never/hardly ever	11	3	1	9.9
<b>Knows the CHA<sup>b</sup> in their neighborhood</b>				
Yes	24	6	3	21.7
No, or no CHA <sup>b</sup>	81	32	6	78.3

a) PHCU: primary health care unit.

b) CHA: Community Health Agent.

Most of the patients stated they wanted to continue treatment at the same health care service that monitored them in the first month of treatment (63.8%). Nevertheless, in the sixth month of treatment, only 24.7% replied yes to this question, this being more frequent among patients monitored at the referral center and PHCUs with FHS.

Of the 152 cases studied, 87.5% were cured. Regarding place of treatment, cure performance of PHCUs with FHS was below that of other services and the referral center had the best cure rate (93.8%).

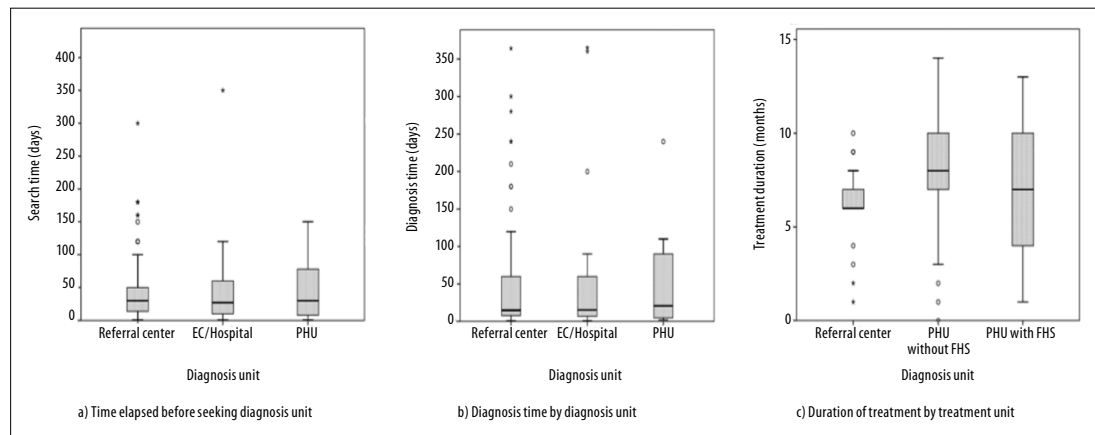
## Discussion

We observed that a large proportion of TB diagnosis was carried out at secondary and tertiary health care services, while diagnosis at Primary Health Care services was much less frequent. It is possible that this finding is due to the delay in case diagnosis time, this being contrary to the National Primary Health Care Policy recommendations.<sup>3</sup> The fact of Primary Health Care being less involved in TB case diagnosis and monitoring makes it difficult to operationalize the infection control program, control the disease and ensure continuous monitoring. This result may be due to problems with articulating health service networking, together with the population's disbelief in the ability of primary health care to solve problems, thus compromising treatment success.<sup>5</sup>

It is likely that patients experienced operational problems in health services, given that the majority of them reported they wanted to change health service, despite the high rate of adherence to treatment found in this study. However, lack of research into such operational problems was precisely one of the limitations of this study.

It is known that TB cases occur more frequently among individuals of the male sex and young adults.<sup>10,11</sup> In this study, approximately 30% of men went to hospital or emergency care services when they realized they were ill. The fact of this sex/age group seeking diagnosis when they are already ill can be attributed, most of the time, to them sustaining their families financially, whereby it can be assumed they are not willing to sacrifice their provider roles, claiming they do not have time or are afraid of losing their jobs if they take time off work to take care of their health.

Hospitals and emergency care services enable more rapid access and diagnosis: besides being open 24 hours a day, they have more technological support, such as x-ray equipment, so that patients do not have to seek one service after another and, consequently, spend more on transport, among other reasons.<sup>12</sup> There is also more technological support at the TB referral center, where it is possible to carry out chest x-rays in a timely manner. Health care services need to be organized in such a way that they can cope



Legend:  
 EC: emergency care.  
 PHU: Primary Health Care Unit.  
 FHS: Family Health Strategy.

**Figure 1 – Boxplot showing time elapsed before seeking health care services, length of diagnosis time and duration of treatment by place of diagnosis and treatment, Manaus, Amazonas, 2014**

with the needs of patients suspected of having TB,<sup>13</sup> where these services are structured according to recommended care practices, focused on the most vulnerable population – in this case, young men – so as to expand access to diagnosis and treatment. All TB investigation is capable of being carried out at the primary care level.

As part of the efforts to minimize this problem, in 2012 the Manaus Municipal Health Department committed to extending opening hours at ten municipal PHCUs, so that they are open from Monday to Friday, from 7 a.m. to 9 p.m., and on Saturdays, from 7 a.m. to 1 p.m. Although this has enabled more access, coverage is still compromised, because this number of PHCUs accounts for less than 10% of primary care services, and thus fails to meet the demand existing in the municipality.

Another TB program coordination initiative was the deployment in 2014 of rapid molecular testing to detect *M. tuberculosis* (RMT-TB) in Manaus, enabling sputum sample processing and diagnosis within two hours.<sup>14</sup> However, access to RMT-TB is only found in six locations in the city: four district laboratories, the state referral center and the Amazon Tropical Medicine Foundation. Despite the technology available, the logistics for the delivery of biological material were not altered in relation to sputum smear microscopy, and requires the patient to return in order to receive the examination result.

For several decades, TB care services in Manaus were centered on the state referral center. Although decentralization of Primary Health Care actions has been planned since 1990, it was only with effect from 2003 that these PHCUs increased their participation in case monitoring, most of which were transferred from the state referral center.<sup>15</sup> Even with the expansion of the role of PHCUs in TB control, at least 37.8% of new cases continued to be notified by the referral center as at 2012. This percentage is influenced by low FHS coverage which, for example, was 30% in 2016, (<[http://dab.saude.gov.br/portaldab/historico\\_cobertura\\_sf.php](http://dab.saude.gov.br/portaldab/historico_cobertura_sf.php)>. Accessed on: 25 Oct 2017), thus hindering the implementation of decentralized actions.

The strategy of sending new pulmonary TB cases diagnosed in other health care services to primary care services is essential, both for case notification and tracking, and also in the educational sense of orienting patients to use the primary health care network. Furthermore, it requires health professionals to organize services to attend to these cases, providing improvements in the volume of activities, increasing the number of symptomatic respiratory patients examined, the number of sputum smears performed, as well as detection of new cases and contact control.<sup>16</sup>

The shortcomings of Primary Care regarding TB diagnosis is evident when considering that out of the 21.7% of patients who knew the community health agent (CHA) responsible for their neighborhood, only

**Table 3 – Patient relationship with tuberculosis treatment service, Manaus, Amazonas, 2014**

Variables	Place of treatment			%
	Referral center	PHCU <sup>a</sup> without FHS <sup>b</sup>	PHCU <sup>a</sup> with FHS <sup>b</sup>	
<b>Booking medical appointments</b>				
In advance, or referral	22	37	9	44.7
Join an appointment waiting list	43	33	8	55.3
<b>Waiting time for initial care</b>				
Up to 1 hour	55	65	15	88.8
More than 1 hour	10	5	2	11.2
<b>Monitoring of treatment by the same health professionals</b>				
Always	36	51	14	67.4
Most of the time	28	17	2	31.3
Hardly ever	1	0	1	1.3
<b>If they need to ask about the disease/treatment, who do they ask</b>				
Family and friends	9	6	5	13.3
Health professionals	24	45	9	52.0
Didn't need to ask questions	32	17	3	34.7
<b>Who is the professional who answers the questions</b>				
Professional with a graduation degree	9	37	8	–
Professional with high school qualifications	15	8	1	–
<b>Booking return visits</b>				
Scheduled in advance	22	37	9	44.7
Join an appointment waiting list	43	33	8	55.3
<b>Received home visits</b>				
Yes	0	12	8	13.3
No	65	56	9	86.7
<b>If bacilliferous, how many follow-up sputum smears were carried out</b>				
Up to 3 smears	–	25	10	42.2
More than 3 smears	–	41	7	57.8
<b>Number of months in which missed appointments</b>				
None	35	49	8	60.5
1 month or more	30	21	9	39.5
<b>Number of months in which they were late for appointments</b>				
None	55	62	11	84.2
1 month or more	10	8	6	15.8
<b>Wanting to continue the treatment at the health service - 1st month</b>				
Yes	56	33	8	63.8
No	9	37	9	36.2
<b>Wanting to continue the treatment at the health service - 6th month</b>				
Yes	18	15	4	24.7
No	47	53	13	75.3
<b>Treatment outcome</b>				
Cured	61	61	11	87.5
Not cured	4	9	6	12.5

a) PHCU: primary health care unit.

b) FHS: Family Health Strategy.



9% were diagnosed at Primary Health Care facilities. Although the role of CHAs is recognized as important for TB control, studies have identified that in many PHCUs with FHS, there are no specific activities aimed at active tracing of symptomatic respiratory patients through home visits, even though CHAs are responsible for case identification and planning these actions.<sup>6,17</sup>

It is important to consider that nearly 70% of individuals diagnosed at the referral center were referred by health professionals or health services. This points to the need for training health professionals to identify symptomatic respiratory patients, so as to help to achieve correct diagnosis and early treatment and thus prevent the spread of the disease. Approximately 30% of patients accessed the state-level referral center on their own initiative or when recommended by friends, showing that the population, in general, is unaware of the municipal health care network. The population does, however, have expectations as to referral center resolvability, where spontaneous demand for services is met and there are resources capable of providing quick diagnosis, unlike the municipal network where having x-rays requires more time, given that these services have not been decentralized to all PHCUs.

Out of 61 patients with fewer than eight years of schooling, 60 used the referral center or emergency care as a health service for diagnosis. Low level of schooling acts as a socio-cultural barrier in accessing services, given the lack of knowledge and unawareness about this health problem, leading patients to ignore TB symptoms for a long time.<sup>6,18</sup>

Late diagnosis, a factor considered to be serious from an epidemiological point of view,<sup>19</sup> arises from the way services are organized and how professionals deal with the problem of TB. The more serious and long-lasting TB symptoms are, the more the disease will spread. Therefore, efforts are needed to educate all stakeholders involved in addressing TB, with the aim of reducing its transmission to the population.<sup>19</sup>

There is no consensus in the literature on the definition of the ideal time for diagnosing TB. It is estimated that this period should not exceed two or three weeks after the onset of symptoms. In our study, the median time between perceiving symptoms and accessing a health service ranged from 27 to 30 days among the different diagnosis services investigated, i.e. four weeks, this being considered to be an expected

standard time. However, we emphasize that there is a difference between perceiving oneself to be ill and effectively seeking a health service for diagnosis.<sup>20</sup>

In our study, the median time for TB diagnosis after contact with a health service is relatively less than national<sup>21-23</sup> and international<sup>24-26</sup> findings, according to which this period is usually 30 days or more. Some studies suggest that the time taken for TB diagnosis after the first medical appointment could be related to the type of health service sought by the user as the entry point to the health system, ease of access, the quality and effectiveness of the care given to the sick.<sup>27</sup> Corroborating this assumption, the supposed inability of PHCUs to provide immediate care, compared to easier access to emergency care, may have led TB patients to opt for the latter: the median diagnosis time at the referral center and at emergency care services was about 15 days, in comparison with the longer median time of 21 days at PHCUs.

The median treatment time of six months at the referral center indicates that the majority of the patients finished their treatment within an appropriate time span. In relation to PHCUs, the longer median time observed (PHCU without FHS = 8 months; PHCU with FHS = 7 months) demonstrates the weakness of these units in monitoring cases and closing them in a timely manner, probably because of operational problems with services, such as the long waiting time for complementary exams (chest radiography) for cure evaluation and being put on waiting lists for medical appointments.

We detected a low rate of home visits, and when they did take place they were only for patients on the verge of giving up treatment, including those monitored by PHCUs with FHS. When people with TB receive home visits and are supportively listened to by a Family Health team member, they begin to trust the care provided by that health professional and to trust in their treatment. This reduces cases of treatment abandonment and the occurrence of multidrug-resistant patients. Another important consequence of this process is the bonding of the patient and their family with the health professional in question.<sup>28</sup>

Regarding the bonding relationships analyzed, variables such as being treated by the same professionals and sharing doubts with health professionals were adequate, with the exception of wanting to continue treatment at the health unit in question. Therefore, it is necessary to rethink health practices in the context

of TB in Manaus, since many patients dissatisfied with the service, either because of its location or organization, or because of their relationship with health professionals, may abandon treatment.

The findings of this research indicate the existence of barriers in TB diagnosis and treatment, both at the referral center, also at the primary health care units, although the cure rate recommended by the Ministry of Health was achieved. It is important to highlight that this study is a starting point for further research, in greater depth, on the organization of health services for TB case diagnosis and treatment in the municipality of Manaus.

## References

1. World Health Organization. Global tuberculosis report 2016 [Internet]. Geneva: World Health Organization; 2016 [citado 2019 Mar 15]. 201 p. Disponível em: <https://apps.who.int/medicinedocs/documents/s23098en/s23098en.pdf>
2. Ministério da Saúde (BR). Secretaria de Vigilância em Saúde. Indicadores prioritários para o monitoramento do Plano Nacional pelo Fim da Tuberculose como Problema de Saúde Pública no Brasil. Bol Epidemiol [Internet]. 2017 [citado 2019 mar 15];48(8):1-11. Disponível em: <http://portalarquivos2.saude.gov.br/images/pdf/2017/marco/23/2017-V-48-N-8-Indicadores-priorit-rios-para-o-monitoramento-do-Plano-Nacional-pelo-Fim-da-Tuberculose-como-Problema-de-Sa-de-P-blica-no-Brasil.pdf>
3. Brasil. Ministério da Saúde. Portaria nº 2.436, de 21 de setembro de 2017. Aprova a Política Nacional de Atenção Básica, estabelecendo a revisão de diretrizes para a organização da Atenção Básica, no âmbito do Sistema Único de Saúde (SUS) [Internet]. Diário Oficial da União, Brasília (DF), 2017 set 22; Seção 1:68. Disponível em: [http://bvsms.saude.gov.br/bvs/saudelegis/gm/2017/prt2436\\_22\\_09\\_2017.html](http://bvsms.saude.gov.br/bvs/saudelegis/gm/2017/prt2436_22_09_2017.html)
4. Arantes IJ, Shimizu HE, Merchán-Hamann E. Contribuições e desafios da Estratégia Saúde da Família na Atenção Primária à Saúde no Brasil: revisão da literatura. Ciênc Saúde Coletiva [internet]. 2016 maio [citado 2019 mar 15];21(5):1499-510. Disponível em: <http://www.scielo.br/pdf/csc/v21n5/1413-8123-csc-21-05-1499.pdf>. doi: 10.1590/1413-81232015215.19602015
5. Lopes LMG, Vieira NE, Lana FCE. Análise dos atributos da atenção primária à saúde na atenção à tuberculose no Brasil: uma revisão integrativa. R Enferm Centr O Min [Internet]. 2015 maio-ago [citado 2019 mar 15];5(2):1684-703. Disponível em: <http://www.seer.ufsj.edu.br/index.php/recom/article/view/678>. doi: 10.19175/recom.v0i0.678
6. Sasaki NSGMS, Santos MLSG, Vendramini SHE, Ruffino-Netto A, Villa TCS, Chiaravalloti-Neto F. Atrasos na suspeita e no diagnóstico de tuberculose e fatores relacionados. Rev Bras Epidemiol [Internet]. 2015 out-dez [citado 2019 mar 15];18(4):809-23. Disponível em: <http://www.scielo.br/pdf/rbepid/v18n4/1980-5497-rbepid-18-04-00809.pdf>. doi: 10.1590/1980-5497201500040011
7. Braga JU, Pinheiro JS, Matsuda JS, Barreto JAP, Feijão AMM. Fatores associados ao abandono do tratamento da tuberculose nos serviços de atenção básica em dois municípios brasileiros, Manaus e Fortaleza, 2006 a 2008. Cad Saúde Coletiva [Internet]. 2012 abr [citado 2019 mar 15];20(2):225-33. Disponível em: <http://pesquisa.bvsalud.org/portal/resource/pt/lil-644855>
8. Cavalcante EGR. Marcadores de adesão ao tratamento da tuberculose: uma proposta para a atenção primária à saúde [tese]. São Paulo: Universidade de São Paulo; 2012. Disponível em: <http://www.teses.usp.br/teses/disponiveis/7/7141/tde-08012013-110012/en.php>. doi: 10.11606/T.7.2012.tde-08012013-110012
9. Belchior AS, Mainbourg EMT, Ferreira-Gonçalves MJ. Loss to follow-up in tuberculosis treatment and its relationship with patients' knowledge of the disease and other associated factors [Internet]. Rev Salud Publica (Bogota) [Internet]. 2016 Sep-Oct [citado 2019 Mar 15];18(5):714-26. Disponível em: [https://www.scielo.org/scielo.php?script=sci\\_arttext&pid=S0124-00642016000500714&lng=en&nrm=iso&tlng=en](https://www.scielo.org/scielo.php?script=sci_arttext&pid=S0124-00642016000500714&lng=en&nrm=iso&tlng=en). doi: 10.15446/rsap.v18n5.54842

## Authors' contributions

Sacramento DS and Goncalves MJF took part in the conception and design of the study, analysis and interpretation of the results, writing and critical review of the intellectual content of the manuscript. Lavor DCBS, Oliveira LRT and Lopes APB contributed to data analysis and interpretation, writing and critically reviewing the intellectual content of the manuscript. All the authors have approved the final version and declared themselves to be responsible for all aspects of the study, ensuring its accuracy and integrity.

10. Basta PC, Marques M, Oliveira RL, Cunha EAT, Resendes APC, Souza-Santos R. Desigualdades sociais e tuberculose: análise segundo raça/cor, Mato Grosso do Sul. *Rev Saúde Pública* [Internet]. 2013 [citado 2019 mar 15];47(5):854-64. Disponível em: <http://www.scielo.br/pdf/rsp/v47n5/0034-8910-rsp-47-05-0854.pdf>. doi: 10.1590/S0034-8910.2013047004628
11. Rhines AS. The role of sex differences in the prevalence and transmission of tuberculosis. *Tuberculosis (Edinb)* [Internet]. 2013 Jan [citado 2019 Mar 15];93(1):104-7. Disponível em: <https://www.sciencedirect.com/science/article/pii/S1472979212001990?via%3Dihub>. doi: 10.1016/j.tube.2012.10.012
12. Paula R, Levefre F, Levefre AMC, Galesi VMN, Schoeps D. Why do tuberculosis patients look for urgency and emergency unities for diagnosis: a study on social representation. *Rev Bras Epidemiol* [Internet]. 2014 Jul-Sep [citado 2019 mar 15]; 17(3):600-14. Disponível em: <http://www.scielo.br/pdf/rbepid/v17n3/1415-790X-rbepid-17-03-00600.pdf>. doi: 10.1590/1809-4503201400030003
13. Balderrama P, Vendramini SF, Santos MSLG, Ponce MAS, Oliveira IC, Villa TCS, et al. Porta de entrada para o diagnóstico da tuberculose: avaliação da estrutura dos serviços. *Rev Eletr Enf* [Internet]. 2014 jul-set [citado 2019 mar 15];16(3):511-9. Disponível em: <https://revistas.ufg.br/fen/article/view/21408>. doi: 10.5216/ree.v16i3.21408
14. Ministério da Saúde (BR). Rede de teste rápido para tuberculose no Brasil: primeiro ano da implantação [Internet]. Brasília: Ministério da Saúde; 2015 [citado 2019 mar 15]. 63 p. Disponível em: <http://portal.arquivos2.saude.gov.br/images/pdf/2016/janeiro/19/rtr-tb-15jan16-isbn-web.pdf>
15. Marreiro LS, Cruz MA, Oliveira MNE, Garrido MS. Tuberculose em Manaus, Estado do Amazonas: resultado de tratamento após a descentralização. *Epidemiol Serv Saúde* [Internet]. 2009 jul-set [citado 2019 mar 15];18(3):237-42. Disponível em: <http://scielo.iec.gov.br/pdf/ess/v18n3/v18n3a06.pdf>. doi: 10.5123/S1679-49742009000300006
16. Amaral AS, Tamaki EM, Sales CM, Renovato RD. Avaliação da descentralização do programa de controle da tuberculose do nível secundário para o nível primário do sistema de saúde de Dourados-MS. *Saúde Soc* [Internet]. 2010 dez [citado 2019 mar 15];19(4):794-802. Disponível em: <http://www.scielo.br/pdf/sausoc/v19n4/07.pdf>. doi: 10.1590/S0104-12902010000400007
17. Crispim JA, Scatolin BE, Silva LMC, Pinto IC, Palha PF, Arcêncio RA. Agente comunitário de saúde no controle da tuberculose na Atenção Primária à Saúde. *Acta Paul Enferm* [Internet]. 2012 [citado 2019 mar 15];25(5):721-7. Disponível em: <http://www.scielo.br/pdf/ape/v25n5/aop2312.pdf>. doi: 10.1590/S0103-21002012005000021
18. Chang SH, Cataldo JK. A systematic review of global cultural variations in knowledge, attitudes and health responses to tuberculosis stigma. *Int J Tuberc Lung Dis* [Internet]. 2014 Feb [citado 2019 Mar 15];18(2):168-73. Disponível em: <https://www.ingentaconnect.com/content/iatld/ijtld/2014/00000018/00000002/art00008>. doi: 10.5588/ijtld.13.0181
19. Ministério da Saúde (BR). Secretaria de Vigilância em Saúde. Departamento de Vigilância Epidemiológica. Manual de recomendações para o controle da tuberculose no Brasil [Internet]. Brasília: Ministério da Saúde; 2011 [citado 2019 mar 15]. 284 p. Disponível em: [http://bvsm.s.saude.gov.br/bvs/publicacoes/manual\\_recomendacoes\\_controle\\_tuberculose\\_brasil.pdf](http://bvsm.s.saude.gov.br/bvs/publicacoes/manual_recomendacoes_controle_tuberculose_brasil.pdf)
20. Canguilhem G. O normal e o patológico. 6. ed. Rio de Janeiro: Forense Universitária; 2009.
21. Machado ACFT, Steffen RE, Oxlade O, Menzies D, Kristki A, Trajman A. Fatores associados ao atraso no diagnóstico da tuberculose pulmonar no estado do Rio de Janeiro. *J Bras Pneumol* [Internet]. 2011 jul-aug [citado 2019 mar 15];37(4):512-20. Disponível em: <http://www.scielo.br/pdf/jbpneu/v37n4/v37n4a14.pdf>. doi: 10.1590/S1806-37132011000400014
22. Maior ML, Guerra RL, Cailleaux-Cezar M, Golub JE, Conde MB. Tempo entre o início dos sintomas e o tratamento de tuberculose pulmonar em um município com elevada incidência da doença. *J Bras Pneumol* [Internet]. 2012 mar-abr [citado 2019 mar 15];38(2):202-9. Disponível em: <http://www.scielo.br/pdf/jbpneu/v38n2/v38n2a09.pdf>. doi: 10.1590/S1806-37132012000200009
23. Almeida CPBD, Skupien EC, Silva DR. Health care seeking behavior and patient delay in tuberculosis diagnosis. *Cad Saúde Pública* [Internet]. 2015 Feb [citado 2019 Mar 15];31(2):321-30. Disponível em: <http://www.scielo.br/pdf/csp/v31n2/0102-311X-csp-31-02-00321.pdf>. doi: 10.1590/0102-311X00195413
24. Sreeramareddy CT, Panduru KV, Menten J, Van den Ende J. Time delays in diagnosis of pulmonary tuberculosis: a systematic review of literature. *BMC Infect Dis* [Internet]. 2009 Jun [citado 2019 Mar 15];9:91. Disponível em: <https://bmcinfectdis.biomedcentral.com/articles/10.1186/1471-2334-9-91>. doi: 10.1186/1471-2334-9-91

25. Asres M, Gedefaw M, Kahsay A, Weldu Y. Patients' delay in seeking health care for tuberculosis diagnosis in East Gojjam zone, Northwest Ethiopia. *Am J Trop Med Hyg* [Internet]. 2017 May [citado 2019 Mar 15];96(5):1071-5. Disponível em: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5417197/>. doi: 10.4269/ajtmh.16-0892
26. Bogale S, Diro E, Shiferaw AM, Yenit MK. Factors associated with the length of delay with tuberculosis diagnosis and treatment among adult tuberculosis patients attending at public health facilities in Gondar town, Northwest, Ethiopia. *BMC Infect Dis* [Internet]. 2017 Feb [citado 2019 Mar 15];17(1):145. Disponível em: <https://bmcinfectedis.biomedcentral.com/articles/10.1186/s12879-017-2240-0>. doi: 10.1186/s12879-017-2240-0
27. Ponce MAZ, Wysocki AD, Scatolin BE, Andrade RLP, Arakawa T, Ruffino Netto A, et al. Diagnóstico da tuberculose: desempenho do primeiro serviço de saúde procurado em São José do Rio Preto, São Paulo, Brasil. *Cad Saúde Pública* [Internet]. 2013 maio [citado 2019 mar 15];29(5):945-54. Disponível em: <http://www.scielo.br/pdf/csp/v29n5/12.pdf>. doi: 10.1590/S0102-311X2013000500012
28. Silva DR, Silva MS, Silva TE, Tomé VV, Prado LM, Neves TE. O abandono do tratamento da tuberculose e a atuação do profissional enfermeiro: um olhar sobre as referências. *J Manag Prim Heal Care* [Internet]. 2015 [citado 2019 mar 15];6(2):235-45. Disponível em: <http://www.jmphc.com.br/jmphc/article/view/287>

Received on 08/01/2019  
Approved on 11/02/2019

Associated editor: Suele Manjourany Duro –  [orcid.org/0000-0001-5730-0811](https://orcid.org/0000-0001-5730-0811)